

Sociometry Applied to Organizational Analysis: A Review

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ABSTRACT. Sociometric procedures have wide applicability at many stages of employment, including personnel selection, information processing, decision making, performance measurement, team cohesion, and especially leadership, as well as appraisal and career development. Other areas of applicability go beyond the individual career—network analysis, specific populations, and methodological and other findings. A “SYMLOG” perspective emphasizes the importance of including sociometric criteria from several different dimensions to evaluate optimal levels of dominance, friendliness, and task orientation.

THREE OF THE MAJOR AREAS IN WHICH SOCIOMETRIC RESEARCH might be expected to prosper are (a) peer relations among schoolchildren; (b) sociodrama, psychodrama, and related therapeutic contexts; and (c) organizational studies. Among articles with “sociometric” or similar words in their titles (as logged, for instance, in the *Social Sciences Citation Index* in the 1990s), the majority are concerned with the relations among schoolchildren, and about half of those focus on general issues and the rest focus on matters that at least border on abnormality or delinquency. Additional contemporary, explicitly sociometric research focuses on therapeutic work.

Organizational and employment studies represent a third area in which sociometric traditions retain an important—but, in this case, often unacknowledged—role. In this article, we review sociometric research in that area and suggest that it might benefit from some integration with a different tradition, namely, Bales’s Systematic Multiple-Level Observation of Groups (SYMLOG).

Organizational Context

Researchers have reported the increasing appreciation of the value of “360-degree feedback,” whereby workers (and their organizations) benefit from the opinions of an assortment of colleagues (Church & Bracken, 1997; Tornow, 1993). Sociometric theory and research represent part of the foundation of this approach, and it is helpful to review a variety of sociometric findings that, in many cases, have not yet been widely incorporated into contemporary procedures. Sociometry, pioneered by Moreno (1934), entails the empirical study and use of people’s choices of one another for different tasks or in different situations. In this review, we concentrate on findings from a variety of organizations and on laboratory studies but generally exclude findings from studies of groups of school children and of psychotherapy groups.

To provide a framework for this review, we have mainly followed the career of the individual, starting with personnel selection, then the carrying out of a job (information processing, decision making, and performance measurement), and finally the individual’s relating to others (team cohesion) and to managers and other leaders. Leadership is an especially rich topic and, for some authors, is almost synonymous with “high sociometric status.” As a career continues, one also needs to consider appraisal and career development.

For additional, general considerations and examples of sociometry in the workplace, readers can see Jacobs (1945), Moreno (1953, especially pp. 511–513), and Patzer (1976). For reviews of sociometry in general, but applicable to organizations, consult the reports of A. P. Hare (1976, pp. 392–393, 405–408), Lindzey & Borgatta, 1954; Lindzey & Byrne, 1968; Moreno, 1953, 1954). Some findings go beyond the individual career, and these are covered, below, under separate headings—network analysis, specific populations (such as physicians or paper-making teams), and methodological and miscellaneous findings.

In reviewing this material, our strategy, for the most part, has been to emphasize one or more exemplar studies in each area and, in many cases, to comment on the results from a SYMLOG perspective (SYstem for a Multiple-Level Observation of Groups). The SYMLOG system emphasizes the importance of three different dimensions of values: dominance–submission, friendly–unfriendly, and accepting the task orientation of established authority vs. opposing the task orientation of established authority (see, for example, S. E. Hare and A. P. Hare, 1996, p. 2). At the behavioral level, the emphasis in the third dimension is on serious-vs.-expressive behavior (A. P. Hare, 1986, pp. 203). Ordinarily, in both traditional sociometry and SYMLOG, group members make ratings of others in their group or organization. In the heyday of sociometry, however, most researchers were concerned mainly with an *evaluation* (choose or reject) and did not investigate the multidimensional

basis for choice or rejection. Indeed, we begin our review by considering the possible relationship between sociometry and SYMLOG and then turn to the progression through an individual's career, starting with selection.

In the existing literature, researchers have suggested a variety of circumstances in which sociometric procedures have been useful. The authors have not always provided measures of effect size, and much of the research has not been programmatic across a wide variety of contexts. Therefore, findings are often suggestive, rather than definitive. We state this conclusion near the outset of the review so that readers may envision new projects in various contexts that can help set the stage for meta-analytic consideration of sociometric effects (Abelson, 1995, pp. 39–53, 150–153).

Sociometry and SYMLOG

SYMLOG is a social field theory, and the three SYMLOG dimensions are not merely related to each other in an abstract way. Rather, the social interaction is seen as taking place in a particular "region" of the three-dimensional space. For instance, a group discussion on how to deal with a new technology may be mainly located in an assertive, friendly, task-oriented region, while a minority of members may be responding in a negative, unpredictable way. Moreover, the three SYMLOG dimensions have been found to map roughly onto higher-order factors within the "Big Five" personality dimensions (Blumberg, 1997), with dominance incorporating *extraversion* and *openness*, friendliness measured by *agreeableness* and low *neuroticism*, and task-orientation represented by *conscientiousness*.

Moreno and his followers did not have a three-dimensional space clearly in mind nor did they have any way of knowing who was close and who was distant in the space. They assumed that people who chose each other had similar values but did not usually ask what those were. As an early exception, A. P. Hare and R. T. Hare (1948) asked people why they chose each other and proposed a "funnel of friendship," essentially a "cybernetic hierarchy" with values at the top (A. P. Hare, 1976, pp. 163–166). The higher the level on the cybernetic hierarchy, the closer the friendship was proposed to be. The same paradigm holds for colleagues who work together.

Sociometry asks people whom they would choose and assumes common values, whereas SYMLOG asks people about their values and assumes that those would form a basis for interpersonal choice. In his classic work at the Hudson School for Girls, Moreno asked the respondents with whom they wished to live and to work (Moreno, 1953, pp. 104, 260; summarized by A. P. Hare & J. R. Hare, 1996, pp. 74–79). That is the sociometric method that most people followed. Few went on to ask why a person was chosen on a social or work criterion.

Moreno did ask the girls at the Hudson School about their motivations for choice (1953, pp. 328–331). Although he gave a few examples, there are not enough to categorize the material according to SYMLOG's three dimensions. He provided only summary statistics concerning the number of motivations that had to do with either positive or negative choices. He was mostly concerned with finding a "social atom" for the girls who were isolates.

To learn more about individual girls, he used a "spontaneity test." He asked a girl to "throw herself into a state of emotion towards X." The emotions were anger (negative, in SYMLOG terms), fear (submissive–negative–expressive), sympathy (positive–expressive), and dominance. Thus, Moreno (1953, pp. 347–348) had intuitive feeling for the three-dimensional scheme as representing important dimensions for placing a girl in a compatible group.

To understand "pro or con evaluation" in a variety of schemes, including applications to organizational settings, it is useful to introduce a distinction between the situation itself and how one feels about it. Interpersonal relations in a particular office may be friendly and cordial, but a respondent might or might not be in favor of the situation (pro or con). Osgood's semantic differential (Osgood, Suci, & Tannenbaum, 1957) distinguishes between evaluative (good–bad) and two other dimensions of cognitions (strong–weak and active–passive), but the good or bad properties are typically a composite of an object's inherent characteristics and of how the rater feels about them.

In his research on intergroup perceptions, Peabody (1968), too, distinguished between the *evaluative* and *descriptive* aspects of ratings. For example, both Filipinos and Chinese in the Philippines agreed that the Filipinos were relatively free with money and the Chinese relatively concerned with saving, but each tended to use pejorative words (squandering and stingy) when describing the other group and complementary terms when describing themselves (generous and thrifty). Thus, the personal evaluative aspect of a rating may be implicit in the connotations of words chosen by the respondent.

For Maassen, van der Linden, and Akkermans (1997), the second dimension of sociometric status is dominance or "impact level." Bales's SYMLOG Interaction Scoring Form explicitly makes the distinction (Bales & Cohen, 1979). For each act of social interaction, there are ratings not only for where the behavior lies in three-dimensional space (including the friendly–unfriendly dimension) but also for the "Pro/Con," how the actor feels about the behavior. SYMLOG's summary rating forms, however, concentrate on a respondent's precise location of an image in three-dimensional space but do not ask for the rater's detached feelings. If respondents are asked, however, to rate their ideal values, their ratings of self-image are found to be similar to their ideals (A. P. Hare, Hare, & Koenigs, 1996, p. 189).

As a further paradigm that distinguishes between the inherent situation and how one feels about it, recent developments on the Five-Factor Personality

Theory also add two more dimensions, positive and negative valence, in addition to the inherent agreeableness that forms one of the five dimensions (Benet & Waller, 1995).

To summarize, *sociometry only shows compatibility* (how people feel about one another), not the part of the three-dimensional space in which the group is located. Schutz showed that individuals can be compatible if all are personal or all counter-personal—that is, essentially if they are relatively close on the friendly–unfriendly dimension, regardless of whether they are on the positive side or the negative one (Schutz, 1958; see also Lemann & Solomon, 1952).

Even though managers and most people in organizations may be in an assertive–friendly–task-oriented part of SYMLOG’s three-dimensional space, some give more weight to friendly (social) considerations, and some give more weight to task matters, with important implications for how they perceive the group (A. P. Hare, Hare, & Koenigs, 1996).

Five phases in problem solving and group development can be identified. In the first phase the purpose of the group is defined; in the second phase new skills are acquired; in the third phase roles are defined and sufficient morale is developed for the task at hand; in the fourth phase the group members work at the task. Finally, there is a fifth phase, at the end of the life of a group or when it is about to begin a new task, when the meaning of the group is reassessed and, if the group is being disbanded, the relationships between the members and the group are redefined.

Each phase of problem solving and group development requires a different emphasis. Some people are barometric for each phase (Bion, 1961; Stock & Thelen, 1958). For example, in the first phase of group development, when it is necessary to secure overall agreement on the purpose of the group, members who are barometers for dependency are more likely to follow the leader than those who are barometers for “flight” and wish to withdraw from the situation. In the third phase of development, with an emphasis on role clarification and morale, those concerned with pairing are usually supportive whereas those who specialize in fight resist (see A. P. Hare, 1976, page 110 for phases in group development and page 78 for the relationship between group functions and Bion’s types).

In two graduate theses in Israel, students used SYMLOG questionnaires to rate military personnel. One study, which also used the sociometric ratings routinely used in the Israeli Air Force, showed that all air force officers were rated as being in the assertive–friendly–task-oriented SYMLOG octant, but those who complete their term of service as lieutenant colonels were farther out from the neutral center of the three-dimensional space than those who finish as majors. The other thesis showed that Israeli naval instructors who are closest to an ideal profile receive higher ratings on board ship. Many other

studies also support the view that an assertive-positive-task orientation is ideal for most organizational contexts. See, for instance, Hogan's (1988) study of American managers and Bachman's (1988) study of U.S. naval commands.

Organizational Facets

Selection

Few studies have compared work groups assembled by sociometric and nonsociometric procedures, but the findings of one such study (Colarelli & Boos, 1992) are notable, albeit tentative. The participants had been formed into 88 three-person work groups, 44 of which were based on ability (one member from each of three ability levels) and 44 on personal preference (subjects orally described their backgrounds and interests to one another, and they then formed themselves into work groups). The sociometric-based groups reported higher levels of communication, task coordination, peer ratings, cohesion, and job satisfaction. These advantages could stem from either actual or perceived compatibility (cf. Blumberg, 1969). Performance (writing a group report to evaluate a personnel program in an organization of their choice) was about equal for both sets of groups—a rather remarkable finding given that all of the ability-based groups contained at least one high-ability member, whereas that was not necessarily true for the sociometric-based groups. The participants were undergraduates in a course on industrial and organizational psychology. One's confidence in the generality of the findings could be increased if the findings were replicated in occupational settings. At least they are consistent with sociometric lore, including Moreno's accounts of high group satisfaction in teams composed on the basis of members' choices.

In the study by Colarelli and Boos (1992), there is no record of how respondents rated those whom they chose. It seems likely that the sociometric-based groups were relatively homogeneous on friendly-unfriendly or warm-cold and heterogeneous with respect to dominance. That was, moreover, a group composition that could be expected to produce high satisfaction, as in the study by Schutz (1958) in which groups that were compatible as either "personal" or "counterpersonal" were more productive than groups with subgroups of both types. In each case, there was a focal person, main supporting member(s), and a set of followers (see A. P. Hare, 1976, pp. 334ff.).

Adams, Elacqua, and Colarelli (1994) noted that the standard employment interview is like sociometry on two counts—first, that often several people that interview a candidate and say how much they like the candidate, and second, even in a one-on-one interview, the interviewer is trying to judge how well the new person will fit the existing group. They called for research on how interviewers arrive at sociometric assessments of applicants.

It is not obvious that sociometric procedures could be used to decide whom to hire, apart from including judges' ratings within an actuarial selection procedure. After people have been selected to be employed, however, there may be scope for assigning people to teams on the basis of their mutual preferences. The implication from Colarelli and Boos's research is that it would be advantageous to do so. Reputedly, when soldiers in the U.S. Army during World War II were sent as replacements to infantry units in groups of friends, sociometrically chosen, they survived longer than soldiers sent as individual replacements.

Decision Making and Performance

Research seems to have focused more on the question of identifying good decision making rather than on whether people chosen for their decision-making skills actually make better decisions on the job. Decision making is not, of course, a unitary concept, and different kinds of decisions are associated with different predictors. Records of informal communication among 304 employees in the technical division of a medium-sized, medical instrument corporation were collected by Tushman and Romanelli (1983). "Internal communication stars"—those most frequently approached as discussion partners—and boundary-spanning individuals—those strongly linked to external as well as internal sources of communication—were both influential, depending on the nature of their unit's work requirements. Boundary-spanning individuals were most influential when task uncertainty was high—for instance, because the task required information about market or organizational conditions. Individuals with high formal status (managers) were influential in all circumstances.

Good decision making, then, is associated with one's position in a communications network. To be influential, one needs many within-group communication links. For tasks requiring external information, one also needs cosmopolitan links. In other words, good influential decision making typically requires individuals who have substantial internal communication links, but the nature of the task affects the relative desirability of external links. In SYMLOG terms, one needs to be fairly dominant, positive, and task oriented, and one must interact with others in a way appropriate to the job at hand.

Performance depends, of course, on a variety of features, some of them external and related, for instance, to market conditions, and others related to a variety of organizational features, such as ability and team composition, as well as to sociometric-linked properties, such as cohesiveness. Some landmark studies (e.g., Belbin, 1981) do conclude that success is predictable as a function of ability and of teams being composed of members well-placed for a variety of roles, essentially corresponding to specialized combinations of

SYMLOG dimensions. They do not, however, really consider the potential added advantages of including sociometric procedures within team-building processes.

We are not advocating the wholesale, uncritical adoption of sociometric procedures; but such procedures, particularly when they span all three of the SYMLOG dimensions, do seem to merit being tried and evaluated regularly. In 360-degree feedback, which includes sociometric-like procedures, positive results seem much more likely when used for staff development than when fed into appraisal and enforced change, and even benefits in the latter sphere obviously require psychometrically reliable, valid instruments (Fletcher, 1997, pp. 66–82; cf. Fletcher, Baldry, & Cunningham-Snell, 1998; T. H. Shore, Shore, & Thornton, 1992). Moreno appreciated the importance of using criteria that correspond to desired competencies but did not highlight the possible advantages of using feedback for development rather than for imposed changes (which may work poorly in the absence of a benevolent overseer or a cohesive group).

Particular challenges arise when 360-degree feedback is used cross-culturally (Rowson, 1998). Some difficulties may be ameliorated by avoiding such common mistakes as having no clear purpose, insufficient communication, and failure to evaluate ongoing effectiveness (Wimer and Nowack, 1998).

Shiloh and Rotem (1994) did use a sociometric approach with the specific purpose of analyzing decision making among adult Kibbutz members in Israel. Respondents' criteria for good decision makers yielded six categories: vigilance, possession of the right values, persuasive personality, experience, decisiveness, and intuition. These categories, in turn, span the three SYMLOG dimensions to yield a prototypical good decision maker as one that is—yet again—dominant (but taking into account others' needs), moderately friendly, and task oriented (but not to the exclusion of nonconforming “hunches”). That is precisely the SYMLOG profile found cross-culturally for leaders who make effective decisions. This is not to say that cross-cultural differences in leadership performance are nonexistent. For instance, Italian managers have been found to place more emphasis on task-oriented values and less on friendly values than North American managers (Isolabella & Hare, 1996).

Team Cohesion

The ideal profile for a cohesive Olympic sports team may differ from that for a hierarchical work group. In one of the still-rare studies using both traditional sociometric and contemporary SYMLOG procedures, Kalinin and Nilopets (as reported tentatively by Copeland & Straub, 1995) asked Russian respondents to select the four teammates, in order, with whom they most enjoy participating in games and any with whom they do not enjoy participating. The results were scored for sociometric status (weighted number of

choices). Optimum teams were found to have two or three leaders, a majority of supporters, a small number of isolates, and no rejected players.

Lucius and Kuhnert (1997) also found a tendency for sociometrically strong teams in a military college to perform well on a variety of criteria. Breen (1994) used sociometry in two ways, one whereby people choose a person who would like to listen to them, another whom they would nominate to play roles such as head-office person, systems thinker, honest person, and so forth. The main purpose seemed to be to give feedback on why a person was chosen, rather than to reformulate the group.

Sociometric techniques measuring a group's cohesion and other properties, especially trust, can also foster overall group development. Hoffman, Wilcox, Gomez, & Hollander (1992) described step-by-step techniques that have proved effective in organization development, thus helping to remedy previous difficulties in measuring the effectiveness of certain interventions.

On SYMLOG ratings, the optimum levels for both individual players and team totals are to be as friendly and task oriented as possible but to be average on the dominance–submissive dimension—that is, not overbearing. That is similar to the typically moderately high dominance of the ideal leader found in many organizational studies. Ironically, members of sports teams may need a moderate cap on dominance. Effective leaders in American organizations are also rated as relatively low on dominance. Both male and female managers and their subordinates rate effective leaders as several points lower on dominance than on friendliness and task-oriented values (A. P. Hare, Koenigs, & Hare, 1996).

Leadership

Leadership potential can, it seems, be rated reliably by one's peers. For example, in a study of enlisted men carrying out basic training in the American army, the men were rated in one set of groups (of approximately 16 people each), subsequently reshuffled into different groups, and later rated again by their new colleagues (Gordon & Medland, 1965; see also, Reynolds, 1966). With an overall N of 492, correlations between the average ratings received on the two occasions were about .81; this is nearly as great as the correlations of about .90 obtained for other groups that were not reshuffled but rated again by the same peers. It appears that the perceived quality of a person's leadership was largely independent of group and rater. Reliability for ratings made by supervisors (two or three platoon sergeants) was not as accurate—about .45 to .60, perhaps because the ratings were averaged across fewer raters.

Although Moreno distinguished task from social criteria, he and others did not ask about dominance versus submissiveness. As a result, some people

became sociometric stars because they were chosen as good followers and others because they were good leaders. When there was a distinction between a “task leader” and a “social emotional leader” (or “best-liked person”), the task leader typically received fewer choices than the best-liked person. As a result, not all sociometric stars are leaders, and not all active persons are stars (A. P. Hare, 1976, p. 177).

One must bear in mind that leadership can be rated with respect to a variety of qualities and roles, including both instrumental tasks and expressive social ability (Bales & Slater, 1955). Opinion leadership blends task and social elements—for example, the member of a sorority to whom one would turn for advice about clothing. Leadership can be successfully measured in ongoing groups by a variety of methods, including self-report and (formal) leader’s nominations, and, perhaps most reliably, by sociometric ratings (Jacoby, 1974; Sethu Rao & Bhaskaran, 1978). How a given individual is rated is likely to be more consistent for similar categories (e.g., leadership with respect to two categories of products) than for different ones (for instance, choice of cosmetic product brand and taste in room decorations).

Even very different leadership criteria, such as ratings related to living together and working together, are likely, however, to be correlated substantially. (See, for example, some of the classic sociometric research concerned with residential groups of young girls, as reported by Jennings, 1950, pp. 218–224.) Even so, the persons scoring highest on task and social criteria are typically different.

Sociometric procedures can also be adapted as a tool for studying biases in emergent leadership, for example the effects of birth order (Eckstein & Driscoll, 1983) or of diffuse status characteristics such as gender (Gerber, 1996; Ibarra, 1997; Walker, Ilardi, McMahon, & Fennell, 1996). In one study of four-person laboratory groups, men were found to be five times more likely than women to exercise opinion leadership in initially leaderless, mixed-sex groups (Walker, Ilardi, McMahon, & Fennell, 1996). Sex differences were not present, however, when a randomly selected group member was assigned to serve as “leader,” even though the group was given no instructions about the appointed “leader’s” role. In a study by Sywensky, Madden, and Treadwell (1996), men and women did not differ in being viewed as effective as leaders of residence halls in either interpersonal or disciplinary situations. According to scores on the Bem Sex Role Inventory, however, it was better, regardless of sex, to have a masculine gender type—one that was more instrumental than expressive.

Most studies on sociometric determinants of leadership have drawn on only one or sometimes two of the SYMLOG dimensions—usually a friendship criterion or separate choices for task and social criteria—or else have requested global ratings of others’ leadership potential (A. P. Hare, 1976, pp. 154–155).

Polley and Eid (1994) found that Norwegian naval cadets chose leaders on the basis of dominance and conformity but chose co-workers on the basis of friendliness. Given that effective leadership is known to be associated with moderately high levels of being assertive, friendly, and task-oriented, it would seem sensible advice that sociometric bases of leadership selection or evaluation should incorporate separate measures of all three dimensions.

It would be an empirical matter to establish whether people who match (generalized or specific) effective leadership profiles really do make good leaders, and to establish how well the prediction compares with selection based on other procedures such as traditional (more global) sociometric techniques and situational approaches to leadership effectiveness (see, for example, Fiedler & Garcia, 1987). One wishes to know how the best composite predictions were made from the independent and common contributions of the different approaches (A. P. Hare, Hare, & Blumberg, 1998).

Appraisal and Career Development

As a case history in which sociometric procedures were used in industrial counseling, Speroff (1956) recounted the example of a specialized industrial relations group. Unity, cooperativeness, and team spirit had been disintegrating, and interpersonal friction was threatening to destroy the creative work of the group. Although the situation had implications for the careers of all those in the unit, even the unit leader hesitated to counsel the problem individual. Sociometric data corroborated the view that the problem centered on one member of the group, who was intelligent and efficient but arrogant and argumentative. From a modern SYMLOG perspective, one might say that the problematic employee was generally assertive, unfriendly, task oriented, and intelligent—an effective profile apart, of course, from the unfriendly behavior emitted and negative evaluations received. The sociometric data provided an objective framework for counseling interviews, which could highlight an individual's valued properties and proceed to deal with constructive criticisms. Often sociometric data from others are mirrored in an individual's own estimates about how one's best friend and one's least-liked other would describe one. Without proper sampling and controls, the dramatic improvement in that particular group might be attributed to regression to the mean or simply to chance. Nevertheless, the methods described provide useful working hypotheses about potentially valuable procedures, namely to use empirical sociometric data in counseling as well as appraisal (Remer, Lima, Richey-Suttles, White, & Gentile, 1995). Even now, those have not been systematically evaluated.

Seemingly minor situational differences can affect appraisal outcomes. For instance, in keeping with expectation, ratings of a subordinate did tend to be higher when the raters had obtained favorable self-assessment ratings from

the subordinate, although the effect is moderated by the purpose of the ratings (T. H. Shore, Adams, & Tashchian, 1998). Rating context and prior self-knowledge may also be associated with differences among ratings by self, by peers, and by an assessment center (L. M. Shore, Tetrick, & Shore, 1998).

Stogdill (1956) described a number of sociometric indices, on the basis of choices of work partners, that can be used to provide global measures of individuals and teams occupying particular levels within an organization. The list, similar to the set of indexes proposed by Moreno (1953, p. 235) but without reference to the hierarchical position of those making the ratings, follows:

- MG Mentions given—total number of persons mentioned
- GI Mentions given *inside* own unit of organization
- GO Mentions given *outside* own unit of organization
- GA Mentions given to persons in echelons *above* one's own
- GS Mentions given to persons in the *same* echelon as one's own
- GB Mentions given to persons in echelons *below* one's own
- MR Mentions received—total number of mentions received
- RI Mentions received *inside* one's own unit of organization
- RO Mentions received from persons in units *other* than one's own
- RA Mentions received from persons in echelons *above* [one's] own
- RS Mentions received from persons in *same* echelon as [one's] own
- RB Mentions received from persons *below* [one's] own echelon

We need not dwell here on the specific uses Stogdill described—mainly correlations among the indices for particular groups of superiors and subordinates. Even a brief inspection of the list, however, suggests that one can use such indexes to compile an informative picture of the social structure, cohesiveness, and cosmopolitanism of the personnel units within an organization. That picture can, in turn, be used to advantage in counseling individuals about their present and prospective situations (see also Rockwell, 1987).

From a SYMLOG viewpoint, Stogdill's bare list is silent about the specific dimensions being tapped by the indexes. That depends on the criterion of nominations, and those might usefully cover assertiveness, friendliness, and task-orientation, as exemplified in Speroff's case history.

This completes the review of sociometric applications at various stages of individuals' careers. Cutting across this vertical progression are several general topics: network analysis, research with specific populations, methods, and other findings.

Network Analysis

In a relevant case example, three high-technology companies, all operating on different continents, were merged by the large multinational corporation

that owned them and placed under a transgeographical management—a process that has become increasingly frequent and is seen as necessary in a global economy. In the case example, sociometric indices were used to gauge the success of a year-long intervention for facilitating a less-hierarchical, unified leadership style (Bovasso, 1992b).

The main sociometric indexes, calculated for each individual, were density (proportion of all possible direct contacts in which a respondent participates), range (extent to which a subject is influenced by peer groups that do not influence each other, thereby helping to integrate the network), prominence (degree to which a subject is the source of influence), and elitism (extent to which an individual initiates and reciprocates only contacts with relatively prominent others). Appropriate analyses showed that differences between hierarchy levels and across geographical regions decreased over time.

The same case study provided insights into such diverse matters as leadership perceptions, social structure, contagion and anticontagion associated with social influence, and self-perception. As Bovasso (1996, p. 1421) explained, “Psychologists may be underutilizing techniques [sociometric methods of network analysis] of great benefit to their regular design and evaluation of interventions in field settings.”

In addition to summary sociometric ratings, the study of transnational structures could also encompass the tabulation of communications protocols among respondents. Those include not only the direction of verbal communication (on the three SYMLOG dimensions) but also several aspects of the content of the communication, such as a description of substance and of how the respondent feels about it. For face-to-face communication, protocols could also include nonverbal behavior, where that differs from verbal behavior (Bales & Cohen, 1979, pp. 207–212). Indexes of metacommunication might co-vary with group climate and productivity. With regard to the influence of networks on innovative output in emerging technologies, the embeddedness of an organization’s network was positively associated with innovation, but involvement in collaborative research and development had a curvilinear effect on innovative performance, with an intermediate range of involvement being optimal (Debackere, Clarysse, & Rappa, 1996).

In a large professional services firm, the most valued sources of communication were interpersonal ones, from a social network (Burke, 1996). Ironically, controversial innovation may diffuse more in a structured organizational network in which there is limited free movement of ideas and people (Krackhardt, 1997). Organizational transformations are typically accomplished by rapid, discontinuous changes. Improved performance follows independently from management succession and changes in executive teams (Romanelli, 1991; Romanelli & Tushman, 1994). For additional empirical studies, see Iacobucci and Hopkins (1994), McGrath, Blythe, and Krackhardt

(1997), and Stork and Richards (1992). For a review of research concerned with computer-supported social networks, see Wellman, Salaff, Dimitrova, Garton, Gulia, and Haythornthwaite (1996).

Specific Populations

Retail sales. A seemingly pure economic concept such as a firm's portion of a competitive market area has typically been determined by objective indexes such as the density of competing firms in a standard statistical area. Such definitions may ignore not only the reality of exactly which stores in an immediate area provide actual competition but also the effects of sellers' perceptions of that reality (Gripsrud & Grønhaug, 1985). One supported hypothesis, tested in an exemplar study of grocery retailing in a small Norwegian town, is as follows: One's perceived main competitor will influence marketing strategy only if that competitor is geographically the nearest competitor.

Thus, sociometric data can augment traditional economic and geographic information. Criteria of choice may be opportunistic—determining, for instance, who are the perceived competitors. In such cases, it is only if one wished further explanation of the meaning of, say, competitor that one would need to explore underlying dimensions—perhaps to find that a true competitor, in addition to being about equally accessible (geographically) and having a near-identical range of products and services, appeals to similar clientele, perhaps by projecting the same cognitive image in terms of the level of forcefulness, friendliness, and somberness—lightheartedness.

Hospital physicians. Sociometric techniques can also help in the study of relationships with patients and clients. Carmel and Glick (1996) note that compassionate—empathic physicians—those with strong devotion to the welfare of patients on socioemotional as well as scientific—technical dimensions (“both caring and curing”)—are desired by patients but relatively scarce. A sociometric questionnaire filled out by 214 physicians in a large Israeli hospital was used to classify the physicians into high, medium, and low levels of compassion—empathy. Then a self-report questionnaire established that the high scorers were younger, had fewer years in medical practice, and had more prosocial, nonstereotypic attitudes toward patients. Among all three groups, empathy was considered the most important factor for being a good physician and least important for being promoted in the hospital. In SYMLOG terms, the optimal level of physicians' task-seriousness appears to be lower from the patients' point of view than from that of the hospital. The authors concluded that it might be worth introducing into the medical system formal recognition and professional rewards for compassion—empathy, as well as screening med-

ical school applicants accordingly. To take a different example that makes a similar point: Reputedly, in military units, those in the high ranks want F subordinates (task-oriented) and those in low ranks want P leaders (friendly orientation). Sociometry clearly has a part to play in the evaluation of desirable and undesirable personality characteristics for particular professions, including the optimal task-social balance in different contexts.

Other populations. Kadushin (1995) studied the antecedents and correlates of friendship among the innermost circle of the French financial elite. Being part of that circle depended on whether one had graduated from the top French school for administration and, to a lesser extent, on social prestige, political party membership, and residence.

Other authors have used sociometry to study a wide variety of groups and topics, such as the nature of cooperation among Scandinavian ice-hockey players (Salminen & Luhtanen, 1994), dominant coalitions among executive officers of small banks (Pearce, 1995), social relationships and the underuse of competence in paper-making teams (Tuominen, 1996), ratings of child-care staff (Beglen, 1983), housewives wishing to re-enter the work force (Bilaniuk, 1988), miners (Reimer & Spanhel, 1983), religious vocationers (Imoda & Rulla, 1978), scientific workers (Nidek, Rosenbaum, & Rosenbaum, 1991), and teachers (Musil, 1976). In some of the above cases, sociometric techniques suggested the value of fine-tuning the optimal dimensional profile of workers in a particular context. In other research, the procedures were mainly useful as a tool in uncovering other findings, such as the curvilinear relationship between external collaboration and innovation.

Methodological and Miscellaneous Findings

Although it is not within the scope of this review to summarize all the methods, techniques, and caveats involving sociometric measurement, some specific pitfalls and other findings merit mention. Indexes of a person's overall sociometric status are typically quite reliable, and the researcher often pools ratings made on several criteria so that distinctions are lost (A. P. Hare, 1976, p. 155). People usually make more choices for working together than for friendship, but often they choose the same people for both. Indeed, many groups have members who score high on sociometric status for both criteria. Also, some respondents choose according to their own interpersonal needs—for example, achievement vs. affiliation motive—regardless of the criterion suggested (French, 1956). People who choose each other sociometrically on the criterion of want-to-work-with might actually be choosing people they prefer to have fun with and not work too hard with, like the group at the back of the Bank Wiring Room at the Western Electric Plant (Roethlisberger & Dickson, 1939; also Homans, 1950).

Improved understanding of organizations can be achieved by linking variables from a variety of levels and methods (Anderson, Payne, Ferguson, & Smith, 1994; House, Rousseau, & Hunt-Thomas, 1995; Rousseau, 1997). One near-artifact merits particular attention. Individuals who give low ratings to others will thereby elevate their own sociometric status, which has not been tainted by the low ratings that they themselves emit (Riedesel, 1974). The effect may be artifactual (if an individual gives out artificially low ratings) or genuine (if the others actually merit lower ratings than the rater does). Therefore, using rankings instead of ratings is not an appropriate solution because it simply removes the effect, regardless of whether it is justified by true differences. If groups are reasonably large, one can deal with the problem by dividing a group into two random or equivalent panels for the purposes of data analysis, and considering only those ratings for which the rater and ratee come from different panels.

The following references deal with additional methodological matters. Loomis and Pepinsky (1948) reviewed classical sociometric methods, and Mouton, Blake, and Fruchter (1955a, 1955b) presented extensive reviews of studies considering reliability and validity of sociometric measures. Other studies were concerned with consistency of ratings (Fiske & Cox, 1960), normative expectations (Titscher, 1995), reasons for choices (Pluckhan, 1973), and social power (Frost & Stahelski, 1988). Formulas for various indexes were reported by Doreian, Kapuscinski, Krackhardt, and Szczypula (1996); Sapin-Lunel (1991); and Smucker (1949). Other methodological points were also investigated (Brugha et al., 1987; Gazda & Mobley, 1994; A. P. Hare, Blumberg, Davies, & Kent, 1994, pp. 285–286; Hurley & Ketai, 1993; Treadwell, Stein, & Leach, 1989).

For additional research bearing on sociometry in organizational and community settings, see Bovasso (1992a); Burns and Wholey (1993); Chevalier, Dedobbeleer, and Tremblay (1995); Clarysse, Debackere, and Rappa (1996); Hart and Nath (1979); Muir (1994); Nakao (1987); Rogers (1974); Stern, Craig, La Greca, and Salem (1976); Davison and Jones (1976); and Teevan, Diffenderfer, and Greenfeld (1986).

Conclusions

Although feedback from a variety of quarters is now fairly widely incorporated into appraisal systems, the advantages of active use of sociometric data, for example, in assigning people to work groups, have not of late been widely researched nor apparently used, despite Moreno's recommendations and the support of such practices provided by earlier studies. Nonetheless, sociometric procedures can be used advantageously in many aspects of organizational activity. Those include assigning people to teams on the basis of their

mutual preferences, encouraging communication links within a group and (where appropriate) externally, selecting leaders at least partly on the basis of multicriteria sociometric ratings, and using empirical sociometric data in counseling and appraisal.

Moreno recognized that sociometric data would be more valid, for both appraisal and action, if respondents rated themselves and others using specific, appropriate task or social criteria. Nevertheless, it is only recently that the likely benefits of explicit use of three aspects of those criteria (the SYMLOG dimensions) have become clearer. Ratings need to be based not only on a summary evaluative (pro-con) criterion but also on dominance (indexed by the amount of social interaction), friendliness, and the acceptance of task orientation.

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The address for the SYMLOG web site is www.symlog.com.

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